Pearson Edexcel

Additional Assessment Materials Summer 2021

Pearson Edexcel GCSE in Chemistry (1CH0) Foundation

Resource Set Topic N – Test 1: Separate Chemistry 2 (F tier only)

Questions

(Public release version)

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Additional Assessment Materials, Summer 2021
All the material in this publication is copyright
© Pearson Education Ltd 2021

General guidance to Additional Assessment Materials for use in 2021

Context

- Additional Assessment Materials are being produced for GCSE, AS and A levels (with the exception of Art and Design).
- The Additional Assessment Materials presented in this booklet are an **optional** part of the range of evidence teachers may use when deciding on a candidate's grade.
- 2021 Additional Assessment Materials have been drawn from previous examination materials, namely past papers.
- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.

Purpose

- The purpose of this resource to provide qualification-specific sets/groups of questions covering the knowledge, skills and understanding relevant to this Pearson qualification.
- This document should be used in conjunction with the mapping guidance which will map content and/or skills covered within each set of questions.
- These materials are only intended to support the summer 2021 series.

2 Figure 3 shows two tests carried out on a white solid and the results of the tests.

	test	results
test 1	flame test carried out	a yellow flame
test 2	dilute hydrochloric acid added gas given off passed into limewater	effervescence occurs the limewater goes milky

Figure 3

(a) Which ion is shown to be present by the result of test 1?

(1)

☒ **A** lithium

☒ **B** sodium

☒ **C** potassium

☒ **D** calcium

(b) (i) State the name of the gas given off in test 2.

(1)

carbon dioxide

(ii) State the name of the ion shown to be present in the white solid by the result of test 2.

(1)

carbonate ion

(c) A flame photometer can be used to measure the concentration of potassium ions in a solution.

Figure 4 shows the photometer readings for three different concentrations of potassium ions in solutions.

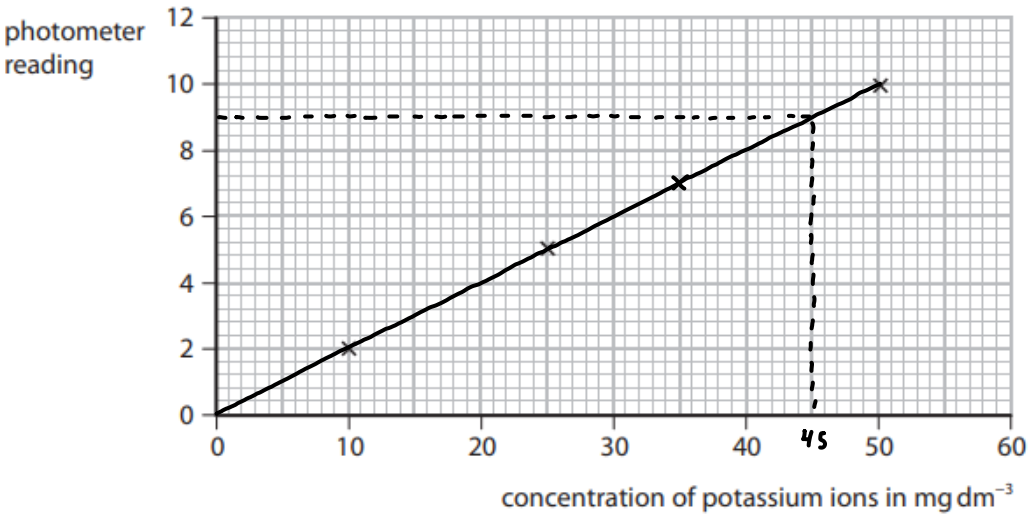


Figure 4

(i) A solution containing a concentration of potassium ions of 35 mg dm^{-3} is placed in the photometer.
The photometer reading is 7.0.

Plot this point on the graph and then draw the straight line of best fit.

(2)

(ii) Another solution of potassium ions gives a photometer reading of 9.0.

Use the graph to find the concentration of potassium ions in this solution.

(1)

concentration = 45 mg dm^{-3}

4 (a) Nanoparticles are found in some sunscreens.

(i) An atom has a radius of about 0.1 nm.

A nanoparticle might have a radius of about

(1)

☒ **A** 0.01 nm

☒ **B** 0.1 nm

☒ **C** 50 nm

☒ **D** 1 cm

(ii) A useful property of nanoparticles in sunscreens is that they

(1)

☒ **A** have a low surface area to volume ratio

☒ **B** are toxic

☒ **C** are white

☒ **D** prevent harmful UV radiation reaching the skin

(iii) A nanoparticle has a surface area of 38 400 nm^2 and a volume of 51 200 nm^3.

Calculate the surface area to volume ratio.

(2)

$\frac{51200}{38400} = 1.33$

surface area to volume ratio = 1.00 : 1.33

(b) The molecules of three organic substances **A**, **B** and **C** are shown in Figure 6.

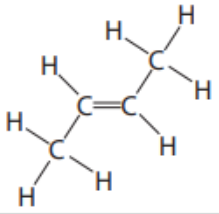
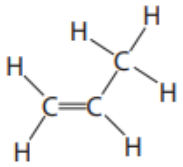
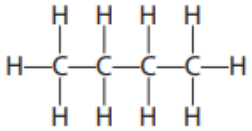
substance A	substance B	substance C
		

Figure 6

(i) A small volume of bromine water is added to each of the substances **A**, **B** and **C** and the mixtures shaken.
Explain why **A** and **B** decolourise bromine water but **C** does not.

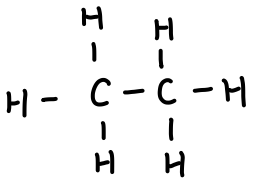
(3)

A and B are alkenes which have a double bond. The double bond reacts with bromine. Bromine gives the solution an orange brown colour, so when bromine has reacted the mixture decolourises. C does not have a double bond so it does not react with bromine.

(ii) Ethane, C_2H_6, is a hydrocarbon.

Draw a molecule of ethane showing all covalent bonds.

(2)



(iii) State why ethane is described as a **hydrocarbon**.

(2)

H only contains hydrogen and carbon.

7 (a) Qualitative tests are carried out on ionic substances to identify the ions present in the substances.

The test for a given ion must be unique to that ion.

(i) Explain why the test for a given ion must be unique to that ion.

(2)

So that the result of the test can be used to determine if the ion is present or absent.

(ii) In the test for the carbonate ion, CO_3^{2-}, dilute hydrochloric acid is added to the solid being tested.

State the name of the gas produced in the test if carbonate ions are present.

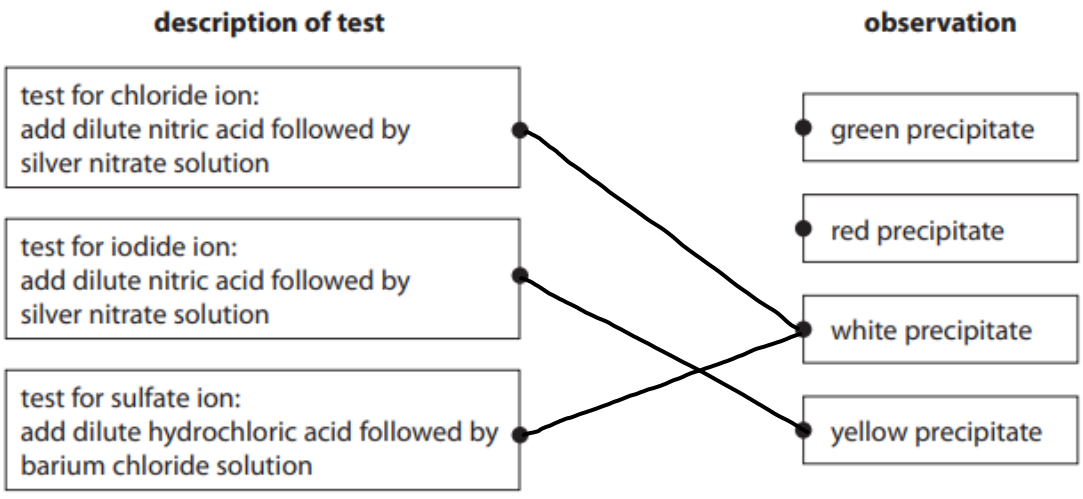
(1)

carbon dioxide

(iii) Tests for three ions are described.

Draw one straight line from the test for each ion to the observation that shows that ion to be present.
Each observation may be correct for one test, more than one test, or for none of the tests.

(3)



*(b) A white solid is known to be a chloride in which the metal ion is sodium, potassium, calcium or aluminium.

A chemist was told to carry out a test for each metal ion that could be present in this white solid.

Describe tests to show the presence of each of these metal ions.

(6)

Dissolve the solid in distilled water. Dip a piece of wire made from unreactive metal (such as nichrome wire) in the solution and place the wire on a flame on the bunsen burner. If the flame turns yellow, sodium ions are present. If potassium ions are present, the flame turns lilac. If calcium ions are present, the flame turns orange-red. There will be no colour change if aluminium is present.

NaOH can be added to the solution of the solid to determine if aluminium ions are present. white precipitate will form, and it dissolves in excess NaOH to give a colourless solution.

2bi-ii-iii 2020 2F

(b) (i) Nanoparticles are very small.

Some nanoparticles have a radius of 17 nm.
The radius of a magnesium atom is 0.16 nm.

Approximately how many times larger is the radius of these nanoparticles than the radius of the magnesium atom?

(1)

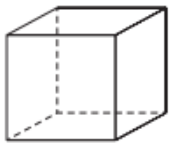
- ☒ **A** 0.01
- ☒ **B** 0.10
- ☒ **C** 10
- ☒ **D** 100

$\frac{17}{0.16} = 106.25$

$\simeq 100$

(ii) A catalyst contains cube-shaped nanoparticles.
Figure 3 shows a diagram of a cube-shaped nanoparticle.

The length of each side of the cube is 9 nm.



© Gauravjuvekar

Figure 3

Calculate the surface area of the cube, in nm^2.

(2)

$6 \times 9^2 = 486$

surface area = 486 nm^2

(iii) Nanoparticles have many uses.
Some scientists are concerned about the possible risks of using nanoparticles.

Give **one** possible risk of using nanoparticles.

(1)

They can be breathed in and catalyse harmful reactions in cells.

4 Tests are carried out to identify the ions in two solids, **P** and **Q**.

(a) A flame test is used to identify the metal ions in each of these solids.

(i) Describe how to do a flame test.

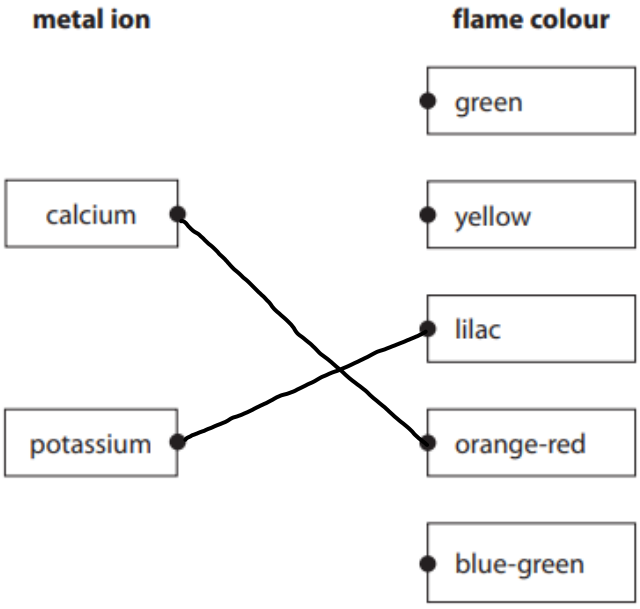
(2)

Dissolve the solid in distilled water. Dip a piece of unreactive metal such as nichrome wire wire in the solution and place the metal wire on a flame on the bunsen burner. Observe any colour change of the flame.

(ii) Different metal ions produce different coloured flames.

Draw one straight line from each metal ion to its flame colour.

(2)



(b) **P** and **Q** dissolve in water to form colourless solutions.

Figure 7 shows the results of tests on these solutions.

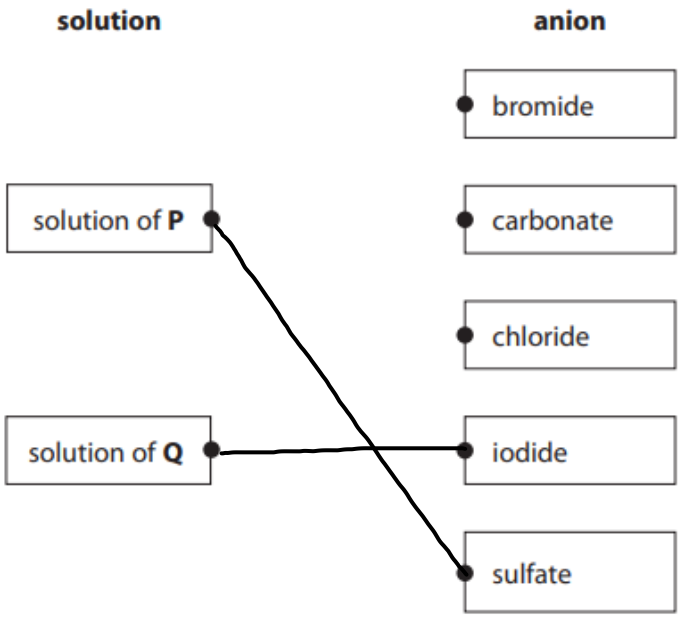
test	results	
	solution of P	solution of Q
dilute hydrochloric acid added, then barium chloride solution	a white precipitate	remains colourless
dilute nitric acid added, then silver nitrate solution	remains colourless	a yellow precipitate

Figure 7

(i) The anions in solutions of **P** and **Q** can be identified from the results of the tests shown in Figure 7.

Draw one straight line from each solution to the anion present.

(2)



(ii) The formula of barium chloride is $BaCl_2$.

Give the total number of ions in the formula $BaCl_2$.

(1)

3

(c) A few drops of sodium hydroxide solution are added to a solution of iron(II) sulfate. Iron(II) hydroxide is formed.

(i) State what would be **seen**.

(2)

green precipitate formed , insoluble in excess

(ii) One other product is formed in this reaction.

What is the name of this other product?

(1)

☒ **A** iron(II) chloride

☒ **B** sodium chloride

☒ **C** sodium sulfate

☒ **D** water